

**CLAIMS:**

- 1) A system for neutralization of pollutant gases contained in the exhaust gases in particular of internal combustion engines, comprising at least one pollutant-neutralization means, one filter means and one noise-abatement means, characterized in that the means for neutralization of the pollutant gases is a pyrolysis furnace designed to hold back and destroy the residues of incomplete combustion, by using means having, at pyrolysis temperature, a very large surface for exchange with the said gases.
- 2) A system for neutralization of pollutant gases according to claim 1, characterized in that the means for neutralization by pyrolysis having a very large surface for exchange with the said pollutant gases are composed of an assembly of spheres, each of which is provided over its entire surface with a plurality of protuberances (1, 2, 3), for example of the diamond-apex type or similar.
- 3) A system for neutralization of pollutant gases according to claims 1 and 2, characterized in that the spheres which are each provided over their entire surface with a plurality of protuberances, for example of the diamond-apex type or similar, are machined from rock of any nature whatsoever.
- 4) A system for neutralization of pollutant gases according to claims 1 and 2, characterized in that the spheres which are each provided over their entire surface with a plurality of protuberances, for example of the diamond-apex type or similar, are machined from calcareous rock.
- 5) A system for neutralization of pollutant gases according to claims 1 and 2, characterized in that the spheres which are each provided over their entire surface with a plurality of protuberances, for example of the diamond-apex type or similar, are made by molding of mineral powder, preferably of calcareous nature.
- 6) A system for neutralization of pollutant gases according to claims 1 and 2, characterized in that the spheres which are each provided over their entire surface with a plurality of protuberances, for example of the diamond-apex type or similar, are formed as two welded parts by deep-drawing of a sheet of metal of very fine thickness, with good heat transmission coefficient.
- 7) A system for neutralization of pollutant gases according to claim 1, characterized in that the means for neutralization of the pollutant gases having a very large exchange surface is composed of a stack of very thin metal plates with good heat transmission coefficient, each provided over its entire surface with a plurality of preferably identical protuberances (10, 11, 12), deep-drawn in staggered arrangement relative to the direction of circulation of the gases.
- 8) A system for neutralization of pollutant gases according to claim 1, characterized in that the means for neutralization of the pollutants having a very large surface of contact and reaction with the said exhaust gases is composed of one very thin metal plate (22) with good heat transmission coefficient, provided over its entire surface with a plurality of preferably identical protuberances (10, 11, 12), deep-drawn in staggered arrangement relative to the direction of

circulation of the gases, the said plate being rolled up as a spiral and introduced into the housing (23) of a cylindrical pyrolysis furnace (21) provided with thermal insulation (24), wherein the said rolled-up plate can be packed beforehand into a stainless-steel "thimble" and wrapped with stainless-steel netting.

- 9) A system for neutralization of pollutant gases according to claims 1 and 8, characterized in that the rolled-up plate (22) having very large exchange surface is heated to temperature at the beginning of passage of the pollutant gases by using the said plate as an electrical resistor.
- 10) A system for neutralization of pollutant gases according to claim 1, characterized in that the pyrolysis furnace for neutralization of the pollutants, having a large surface for exchange with the said pollutant gases, is composed of an assembly of interchangeable electrical resistors (32) rolled up as flat spirals and stacked into a thermally insulated housing (30).
- 11) A system for neutralization of pollutant gases according to claims 8, 9 and 10, characterized in that, in the case of internal combustion engines, the pyrolysis exchange surface is heated to temperature by discharge of capacitors of adequate capacitance at the moment at which the said engines are started.
- 12) A system for neutralization of pollutant gases according to claims 1, 2 and 6, characterized in that the exchange and pyrolysis surface of the pyrolysis furnace (38) is composed of an assembly of hollow metal spheres (7) provided with protuberances (1, 2 or 3) and filling the housing (39) thereof.
- 13) A system for neutralization of pollutant gases according to one of claims 1 to 6, characterized in that the exchange and pyrolysis surface of the pyrolysis furnace (44) is composed of an assembly of mineral spheres provided with protuberances (1, 2 or 3), packed in stainless-steel netting, guided into a stainless-steel thimble (47) and introduced into the housing (45) of the furnace after interposition of round pads (50, 51) intended to fragment the large particles or unburned or partly burned HC on impact, composed of a tangle of stainless-steel chips, preferably disposed upstream from the pyrolysis spheres or plates.
- 14) A system for neutralization of pollutant gases according to claims 1 and 7, characterized in that the pyrolysis furnace (55) is composed of a metal housing (57) of rectangular cross section, wrapped by thermal insulation (58), provided with an inlet pipe (59) for the pollutant gases or fumes and an outlet pipe (60) offset from one another, into which there is introduced an assembly of pyrolysis plates (56) provided with identical protuberances (10 or 11 or 12).
- 15) A system for neutralization of pollutant gases according to one of the preceding claims, characterized in that the pyrolysis furnace (70) is disposed as close as possible to the engine and is entirely thermally insulated, as is the pipe for evacuation of the exhaust gases between the internal combustion engine and the said pyrolysis furnace.
- 16) A system for neutralization of pollutant gases according to one of the preceding claims, characterized in that it is composed of modules assembled together or integrated, chosen as a

function of the flow and nature of the pollutant gases from among all or part of the following modules: round pads (50, 51) for fragmenting the large particles, pyrolysis furnace module (70), module (71) for filtering out and purifying the pollutant gases, module (72) for injection of a deodorizing and neutralizing liquid of the "Zinc RINICEOLAT" type, injected with compressed air to ensure vaporization thereof, and module (73) for noise abatement and reduction of the temperature of the gases.

- 17) A system for neutralization of pollutant gases according to one of the preceding claims, characterized in that, for large or very large flows of pollutant gases, the pyrolysis function is assured by a group of furnaces provided with an inlet manifold and an outlet manifold and cooperating whenever necessary with a fume extractor.